

REMARKS

Claims 22 to 52 are currently pending in the application. Claims 22 to 52 are currently rejected under 35 U.S.C. §103(a).

Rejections Under 35 U.S.C. §103(a)

Claims 22 to 52 are rejected as obvious under 35 U.S.C. §103(a) based on several references. Specifically, Claims 22-29, 31, 34-40, 42, 43, 45, 46, 48, 49, 51 and 52 are rejected as obvious over U.S. Patent Serial No. 4,845,367 to Amirav (“Amirav”) in view of U.S. Patent Serial No. 4,755,344 to Friedman (“Friedman”). Claims 30, 32, 33, 41, 44, 47 and 50 are rejected over Amirav in view of Friedman, further in view of U.S. Patent Serial No. 4,851,669 to Aberth (“Aberth”). Applicants respectfully traverse these rejections.

M.P.E.P. § 2143 states that in order to establish a *prima facie* case of obviousness three basic criteria must be met. First there must be some suggestion or motivation in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference(s) must teach all of the claim limitations. “The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the in the prior art, not in the applicant’s disclosure.” *In re Vaeck*, 947 F.2d 488, 493, 20 USPQ2d 1438, 1442 (Fed. Cir. 1991).

Claim 22 is the sole independent claim. Applicants respectfully submit that a *prima facie* case of obviousness of Claim 22 cannot be established over the combinations of either Amirav and Friedman, or Amirav, Friedman and Aberth. Further, because Claims 23 to 52 depend from Claim 22, Applicants respectfully submit that these claims also cannot be obvious over these combinations.

Claim 22 recites a method for cluster fragmentation comprising the following steps. Producing a neutral cluster comprising a carrier substance comprised of polar molecules, where the cluster comprises at least ten of these molecules. Loading the neutral cluster with at least one reaction partner, where the reaction partner is chemically different from the carrier substance. The reaction partner and the carrier substance in the cluster form at least one pair of differently charged charge carriers, either spontaneously or excited from the outside. Fragmenting the cluster into a plurality of cluster fragments, such that at least one positively charged and at least one negatively charged cluster fragment is formed during the fragmentation. The reaction partner is part of at least one cluster fragment after the fragmentation and the cluster fragments are spatially separated.

As recited in Claim 22, the clusters produced are neutral. As stated at page 6 of the instant specification, cluster generally refers to groups of atoms or molecules, or atom or molecule aggregates relatively weakly bonded by purely physical forces. The neutral cluster is loaded with a reaction partner, which has the capability of forming charged charge carriers with the molecules of the cluster. As recited in Claim 22, the reaction partner does form at least one pair of differently charged charge carriers within the cluster, the cluster as a whole remaining neutral. Loading of the cluster with the reaction partner can occur during cluster formation or at a boundary surface immediately before fragmentation. The cluster is then fragmented to form charged cluster fragments. This fragmentation is achieved by breaking the relatively weak bonds between the molecules of the cluster. Apart from possible proton transfer the molecules stay intact.

The Combination of Amirav and Friedman does not Render Claim 22 Obvious

In contrast, Amirav teaches inducing molecular or dissociative ionization by impinging a substance to be ionized against a solid surface. Amirav, col. 1, lns. 20-47. The

surface used in Amirav is one that is capable of giving or taking an electron from the surface (molecular ionization), or capable of inducing ionization through fragmentation (molecular dissociation). Amirav, col. 1, lns. 48-52. Thus in the case where ionization is achieved by donation or taking of an electron, no fragmentation occurs. Where ionization is achieved by molecular dissociation the fragmentation involves breaking of strong molecular bonds.

Amirav, Fig. 2. Further, in the method disclosed by Amirav, the substance to be ionized is loaded into a beam of light gas. Amirav, col. 3, lns. 28-35.

The Examiner makes the assertion at Page 4 of the current Office Action that Amirav teaches impinging clusters on a solid surface, referencing col. 1, lns. 48-58 and col. 2, lns. 43-65. On review of the cited sections Applicants are unable to locate the alleged reference to clusters. In fact, the reference to clusters that is included in Amirav discusses minimizing cluster formation. Amirav, col. 3, lns. 60-65. To the extent that clusters are formed in the method of Amirav, they are formed by a substance to be ionized.

Nowhere does Amirav discuss forming a neutral cluster of polar molecules and loading the neutral cluster with a reaction partner, where the reaction partner is chemically different from the molecules of the neutral cluster. Further, Applicants respectfully submit that as a result, Amirav cannot teach the formation of at least one pair of differently charged charge carriers by a carrier substance and reaction partner. Finally, Applicants respectfully submit that Amirav does not teach cluster fragmentation as recited in Claim 22, but rather molecular fragmentation.

As a result, Applicants respectfully submit that Amirav does not teach each and every element of Claim 22.

At page 5 of the current Office Action the Examiner recognizes that Amirav does not teach neutral cluster formation by polar molecules. Examiner attempts to cure this

deficiency in Amirav by combining Amirav with Friedman. Applicants respectfully submit that this combination is improper to render Claim 22 obvious for at least the following reasons.

In the first instance, as stated above, Amirav does not teach cluster formation or fragmentation at all. Further, Friedman is drawn to the formation of cluster ions, not neutral clusters. Friedman, col. 1, lns. 23-27. The reference to a cluster containing up to 28 water molecules also states that the cluster contains a single proton. Friedman, col. 2, lns. 29-36. The cluster ions of Friedman are formed by ionizing a gas by means of an electrode, then expanding the gas containing ions and electrons through a supersonic nozzle into a region of low pressure. Friedman, col. 3, lns. 23-32. Therefore, Applicants respectfully submit that even if one were to combine Amirav and Friedman the combination would not cure the fundamental deficiency of Amirav recognized by the Examiner.

Additionally, neither Amirav nor Friedman teach the formation of at least one pair of differently charged charge carriers by interaction of a reaction partner and a carrier substance in a neutral cluster as recited in Claim 22. In Amirav a charge is produced by impinging a substance to be ionized against a solid surface to either add or subtract an electron, or induce molecular dissociation. Friedman utilizes an electrode to induce ionization prior to cluster formation. Further, neither Amirav nor Friedman teach cluster fragmentation to produce oppositely charged cluster fragments as recited in Claim 22. Friedman does not teach fragmentation at all, and Amirav teaches molecular fragmentation. Applicants therefore respectfully submit that the combination of Amirav and Friedman does not disclose each and every element of Claim 22.

Nonetheless, the Examiner asserts that it would have been obvious to modify the method of Amirav by using a carrier gas containing water molecules as taught by Friedman.

Applicants respectfully submit that the combination of Amirav and Friedman is improper, and, as stated above, even if it were proper it would still not teach each and every element of Claim 22.

In order to be a proper combination, there must be some motivation to combine the references. The Examiner has not shown any motivation to combine Amirav and Friedman. "There are three possible sources of motivation to combine references: the nature of the problem to be solved, the teachings of the prior art, and the knowledge of persons of ordinary skill in the art." *In re Rouffet*, 149 F.3d 1350, 1357, 47 USPQ2d 1453, 1457-58 (Fed. Cir. 1998). Amirav teaches the use of light gases such as hydrogen and helium as carriers for a substance to be ionized. Ionization is achieved by impinging the substance to be ionized against a surface capable of giving or taking an electron from the surface, or capable of inducing molecular dissociation (fragmentation). Although Amirav teaches that theoretically any gas can be used, Amirav does not teach or suggest the use of a cluster of polar molecules as a carrier for the substance to be ionized. In fact, Amirav teaches minimizing cluster formation. Friedman on the other hand teaches a method for producing cluster ions. Friedman discloses a number of potential applications for cluster ions at col. 1, lns. 28 -47, however, Friedman does not discuss the use of cluster ions as a carrier for any purpose. Applicants therefore respectfully submit that there is no explicit suggestion in either of Amirav or Friedman to combine the clusters taught by Friedman with the method of Amirav.

Further, Applicants respectfully submit that the problems solved by Amirav and Friedman do not relate to each other, therefore there is no implicit suggestion to combine their teachings. Amirav discloses a method and apparatus for producing ions by surface ionization. Friedman teaches a method of producing ion clusters by ionizing a gas by means

of an electrode to produce ions and electrons, then accelerating the gas through a nozzle to an area of lower pressure to induce condensation of clusters around the ions formed.

Finally, the Examiner has not pointed out any knowledge of one having ordinary skill in the art that would serve as a motivation to combine Amirav and Friedman.

Applicants respectfully submit that for the above reasons Claim 22 cannot be obvious over the combination of Amirav and Friedman. Further, because Claims 23-29, 31, 34-40, 42, 43, 45, 46, 48, 49, 51 and 52 depend from Claim 22, these claims also cannot be obvious over the combination of Amirav and Friedman.

The Addition of Aberth does not Cure the Deficiencies of Amirav and Friedman

The Examiner references Aberth in combination with Amirav and Friedman with respect to Claims 30, 32, 33, 41, 44, 47 and 50. The Examiner relies on Aberth to show an alkali metal reaction partner and a boundary surface coated with a reaction partner.

Applicants respectfully submit that the addition of Aberth to Amirav and Friedman is insufficient to render Claim 22 obvious, and therefore that Claims 30, 32, 33, 41, 44, 47 and 50 cannot be obvious over that combination.

At Page 6 of the current Office Action the Examiner states that Aberth discloses that it is known to direct neutral clusters at a target where the resultant ions are mass analyzed. However, Aberth does not disclose loading a reaction partner on to a neutral cluster wherein the reaction partner and particles in the neutral cluster form at least one pair of oppositely charged charge carriers as recited in Claim 22.

The Examiner also states at Page 6 of the current Office Action that Aberth teaches the use of an ion source to impinge Cesium cluster ions upon a sample coated collision target plate to produce fragmentation, referencing col. 8, lns. 45-65. However, the cited section discloses the generation of molecular sputter ions by impinging cesium ions on a

sample. This reference does not disclose cluster fragmentation to form oppositely charged cluster fragments as recited in Claim 22.

Applicants therefore respectfully submit that Aberth does not cure the fundamental deficiency of the combination of Amirav and Friedman. As a result, Applicants respectfully submit that Claim 22 and further Claims 30, 32, 33, 41, 44, 47 and 50 cannot be obvious over the combination of Amirav, Friedman and Aberth. Reconsideration is respectfully requested.

CONCLUSION

Applicants believe that the foregoing remarks have overcome or rendered moot all grounds for rejection or objection. There being no other rejections or objections, Applicants believe that the application is in a condition for allowance. Applicants therefore respectfully request prompt action on the claims and allowance of the application. If the Examiner believes that personal communication will expedite prosecution of the application, the Examiner is invited to telephone Applicants' undersigned agent directly.

AUTHORIZATION

Applicants believe that a one month extension of time is required to make submission of this response timely, and hereby submit a petition and fee for such extension. However, in the event that an extension of time beyond one month is required, Applicants hereby submit a petition for such extension of time as may be necessary to make this response timely. The Commissioner is hereby authorized to charge the necessary fees to deposit account No. 50-0573. A duplicate of this authorization is enclosed.

Respectfully Submitted,

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